

Candidate Name _____

Centre Number

Candidate
Number

--	--

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
MATHEMATICS
PAPER 2
OCTOBER/NOVEMBER SESSION 2001

0580/2, 0581/2

1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Geometrical instruments

Mathematical tables (optional)

Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 70.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

For π , use either your calculator value or 3.142.

FOR EXAMINER'S USE

--

This question paper consists of 11 printed pages and 1 blank page.

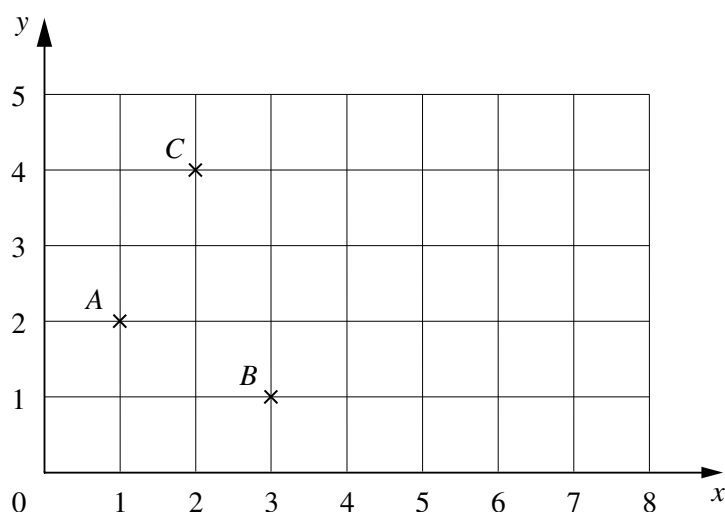
- 1 Work out $3.2 \times 5 - 2(4.1 - 2.9)$.

Answer [1]

- 2 On December 21 st at Cabo de Hornos the sun rises at 04 39.
The sun sets 17 hours 36 minutes later.
Write down the time when the sun sets.

Answer [1]

3



The points A , B and C are marked on the grid above.

- (a) $\vec{CD} = 2\vec{AB}$. Mark and label the point D on the diagram. [1]
- (b) Write \vec{CA} as a vector.

Answer (b) $\vec{CA} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

- 4 (a) Yellow light has a frequency of 5.17×10^{14} hertz.
Green light has a frequency of 5.66×10^{14} hertz.
Work out the difference between these two frequencies.
Give your answer in standard form.

Answer (a) hertz [1]

- (b) One nanometre is 10^{-9} metres. Green light has a wavelength of 530 nanometres.
Write this wavelength in metres, in standard form.

Answer (b) m [1]

- 5 The running time of a video is 4 hours with a possible error of 1%.
Find in hours, minutes and seconds the **least** possible running time of the video.

Answerh.....min.....s [2]

- 6 Elena invests \$ P for 9 months at 4% simple interest per year. She receives \$39 interest.
Calculate the value of P .

Answer $P =$ [2]

- 7 Amit and Sandeep estimate the mass of a car.
Amit says 0.75 tonnes and Sandeep says 60 000 grams.
The actual mass of the car is 650 kilograms.
Calculate, in kilograms, the error in each estimate.

Answer Amit's errorkg [1]

Sandeep's errorkg [1]

- 8 In computing terms, a 'kilobyte' is 2^{10} bytes and each **byte** is 8 **bits**.

(a) 1 kilobyte is 2^x **bits**. Find x .

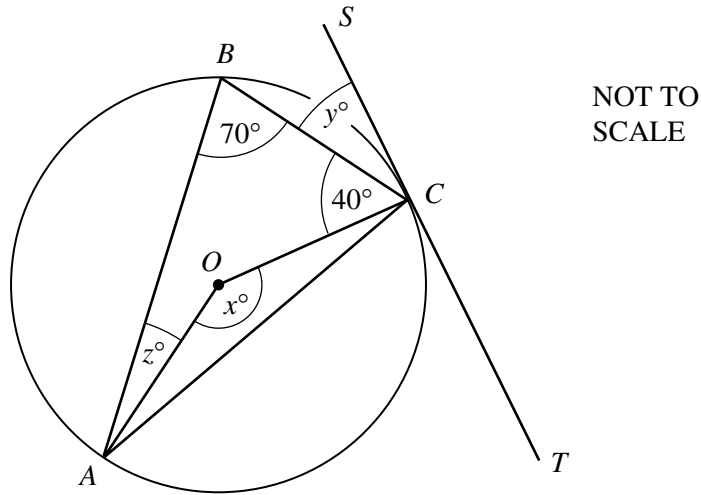
Answer (a) $x =$ [1]

(b) 4 kilobytes is 2^y **bits**. Find y .

Answer (b) $y =$ [1]

4

9



Circle ABC has centre O . The line SCT is a tangent.
Angle $ABC = 70^\circ$ and angle $OCB = 40^\circ$.
Find x , y and z .

Answer $x = \dots\dots\dots$ [1]

$y = \dots\dots\dots$ [1]

$z = \dots\dots\dots$ [1]

10 (a) Factorise **completely** $6x^2 + 6x$.

Answer (a)..... [1]

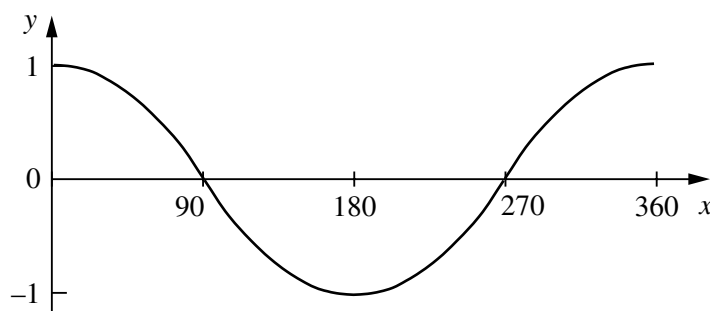
(b) Factorise $6x^2 + 5x + 1$.

Answer (b) [2]

11 A pentagon has angles of $2x^\circ$, $3x^\circ$, $4x^\circ$, $5x^\circ$ and $6x^\circ$.
Calculate the size of its smallest angle.

Answer [3]

12 (a)

NOT TO
SCALE

The diagram shows a sketch of $y = \cos x^\circ$.

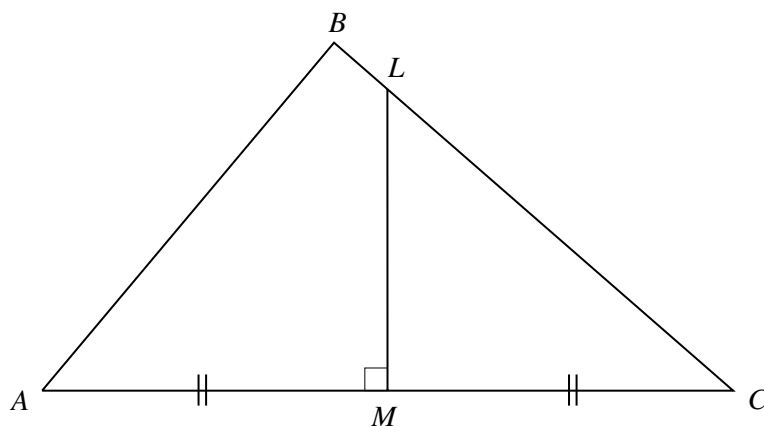
For $0 \leq x \leq 360$, find two values of x for which $\cos x^\circ = \frac{1}{2}$.

Answer (a) $x = \dots\dots\dots$ or $\dots\dots\dots$ [1]

(b) Find the range of values of x for which $0 < \cos x^\circ < \frac{1}{2}$ and $90 \leq x \leq 360$.

Answer (b) $\dots\dots\dots < x < \dots\dots\dots$ [2]

13



In triangle ABC , the line LM is the perpendicular bisector of AC .

(a) Draw, using a straight edge and compasses only, the bisector of angle BAC . [1]

(b) Shade the region in triangle ABC which is less than 5 cm from A , nearer to AC than AB and nearer to C than A . [2]

- 14** In an electrical circuit the current, I amperes, is directly proportional to the square root of the power, P watts.

$I = 4$ when $P = 100$.

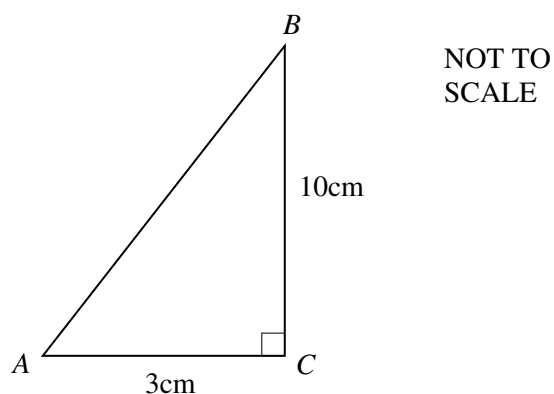
- (a) Find an equation connecting I and P .

Answer (a)..... [2]

- (b) Calculate I when $P = 144$.

Answer (b) $I =$ [1]

15



In triangle ABC , angle $ACB = 90^\circ$ exactly but the lengths $AC = 3$ cm and $BC = 10$ cm are only correct to the nearest centimetre.

- (a) Write down the smallest possible value of AC .

Answer (a).....cm [1]

- (b) Calculate, correct to 1 decimal place, the largest possible size of angle BAC .

Answer (b) [2]

16 Sofia changes x pesetas into rands when the exchange rate is 1 rand = 24 pesetas.

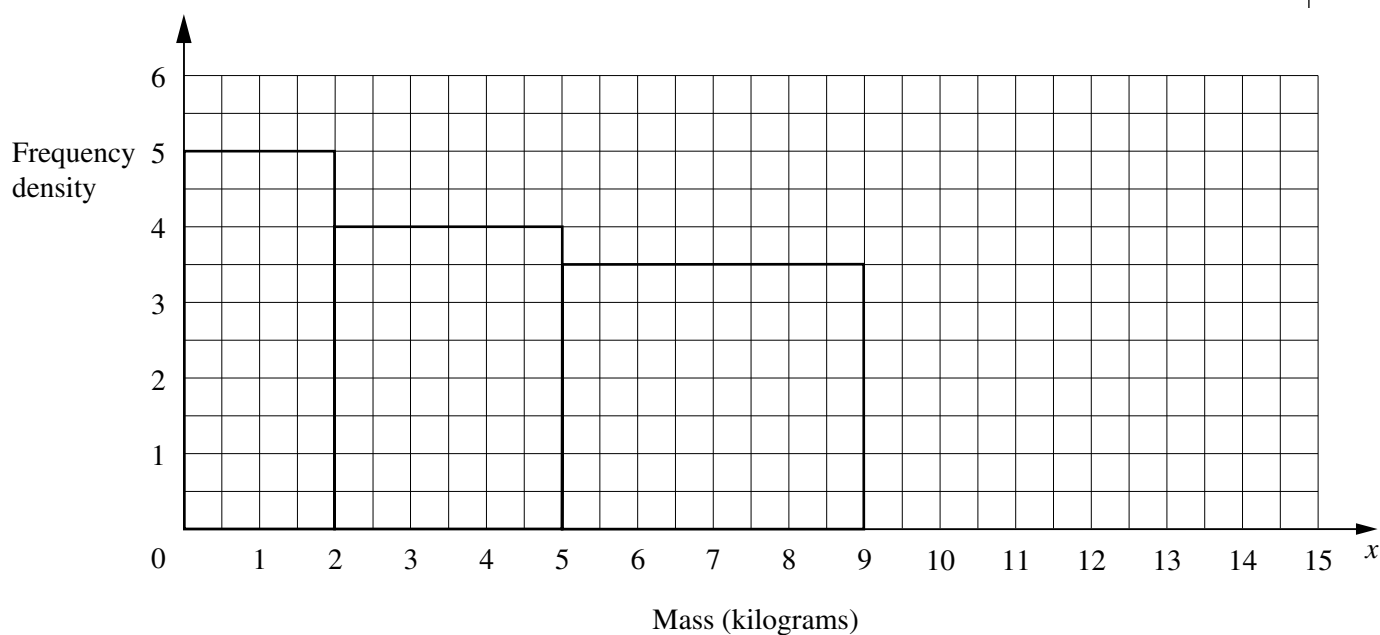
(a) Write down the number of rands Sofia receives, in terms of x .

Answer (a)rands [1]

(b) After she spends 500 rands, Sofia has 800 rands left.
Find the value of x .

Answer (b) $x =$ [2]

17



Mass (x kg)	$0 < x \leq 2$	$2 < x \leq 5$	$5 < x \leq 9$	$9 < x \leq 15$
Frequency	10			12

The mass, x kilograms, of each small child in a hospital was recorded.

(a) Use the histogram to help you fill in the two missing frequencies in the table. [2]

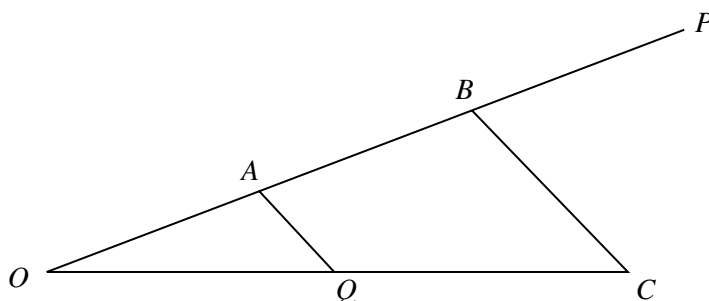
(b) Draw the rectangle for the $9 < x \leq 15$ group on the histogram. [1]

18 Make x the subject of the formula

$$y = \frac{3x}{2} + 5.$$

Answer $x =$ [3]

19



Q is the midpoint of OC and $OABP$ is a straight line with $OA = AB = BP$.

$\vec{OP} = 6\mathbf{p}$ and $\vec{OQ} = \mathbf{q}$.

Find in terms of \mathbf{p} and/or \mathbf{q} ,

(a) \vec{OB} ,

Answer (a) $\vec{OB} =$ [1]

(b) \vec{BC} ,

Answer (b) $\vec{BC} =$ [1]

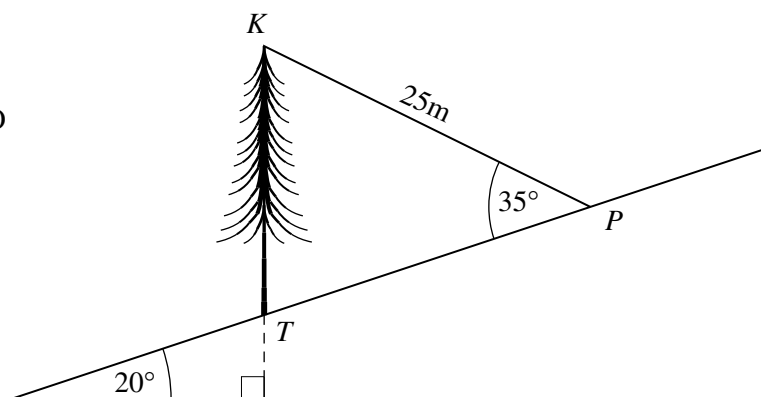
(c) \vec{AQ} .

Answer (c) $\vec{AQ} =$ [1]

(d) Use your answers to **parts (b) and (c)** to explain why AQ is parallel to BC .

Answer (d) [1]

20

NOT TO
SCALE

A tree, TK , grows vertically on a hillside which slopes at 20° to the horizontal.
A kite, K , on the end of a 25 metre string, KP , sticks in the top of the tree.
Angle KPT is 35° .

Calculate

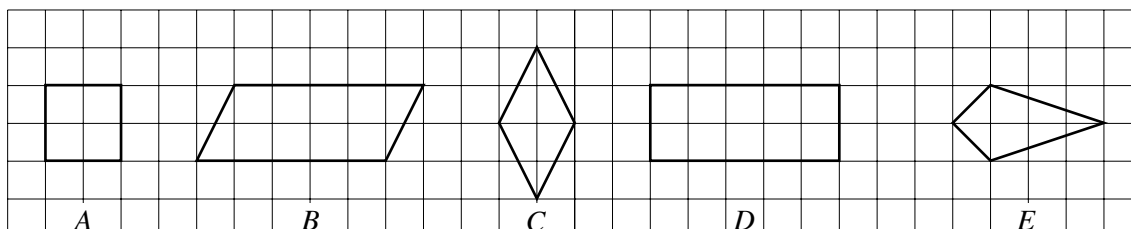
(a) angle KTP ,

Answer (a) Angle KTP = [1]

(b) the height of the tree, KT .

Answer (b) KT = m [3]

21



Five different types of quadrilateral labelled A , B , C , D and E , are shown in the diagram above.

(a) One of the five is chosen at random.

What is the probability that its diagonals **bisect** each other?

Answer (a)..... [1]

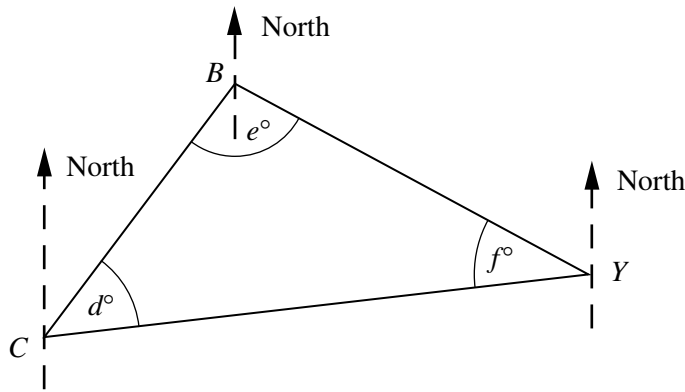
(b) Write down which of A , B , C , D and E have diagonals **intersecting** at 90° .

Answer (b)..... [1]

(c) Write down the special name of each quadrilateral shown in the diagram which has rotational symmetry of order 2.

Answer (c)..... [2]

22

NOT TO
SCALE

A coastguard C sees a boat B on a bearing of 030° and a yacht Y on a bearing of 072° .
The bearing of the yacht from the boat is 136° .

(a) Calculate the values of d , e and f , the three angles of triangle CBY .

Answer (a) $d = \dots\dots\dots$

$e = \dots\dots\dots$

$f = \dots\dots\dots$ [3]

(b) What is the bearing of the coastguard from the yacht?

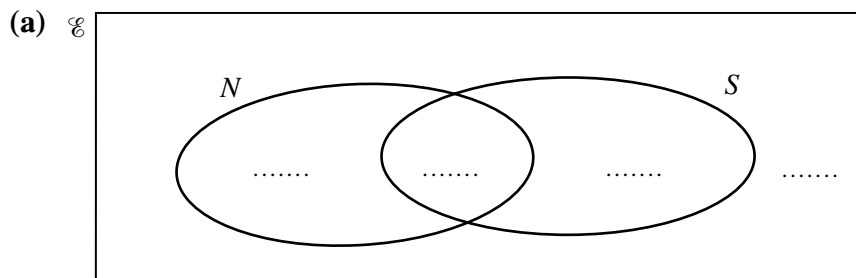
Answer (b)..... [1]

23 One of 36 tourists on holiday in Namibia and South Africa is chosen at random.

The probability that he has been to South Africa before is $\frac{1}{2}$.

The probability that he has been to Namibia before is $\frac{4}{9}$.

The probability that he has been to neither country before is $\frac{1}{3}$.



The set N represents those who have been to Namibia before.

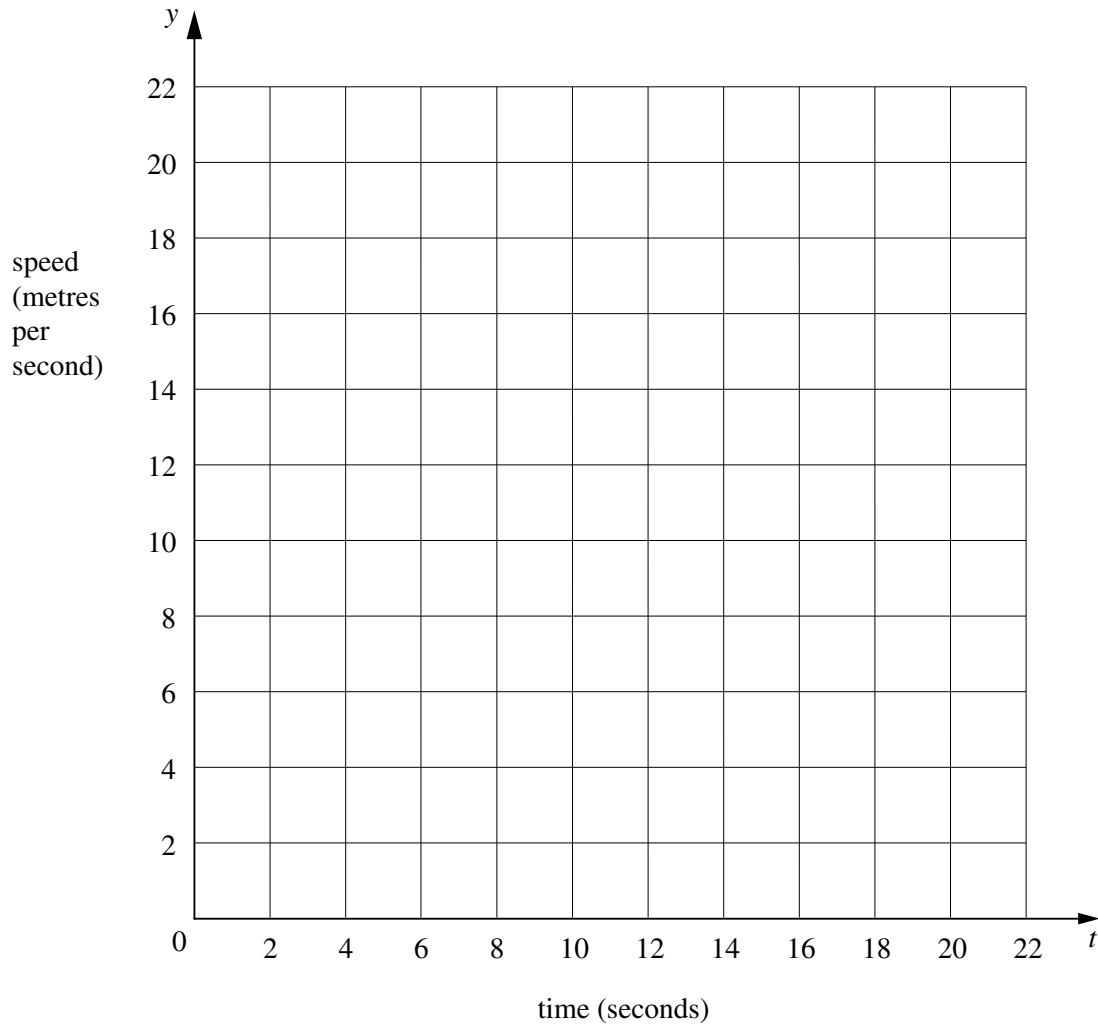
The set S represents those who have been to South Africa before.

Calculate and fill in the number of tourists in each part of the Venn diagram above. [4]

(b) Write down the probability that one of the tourists, chosen at random, has been to both countries before.

Answer (b)..... [1]

24



A car starts from rest with a constant acceleration of 5 m/s^2 for 4 seconds.
 Next it decelerates at 2 m/s^2 for 6 seconds.
 Then it decelerates at $d \text{ m/s}^2$ until it comes to rest again 18 seconds from the start.

- (a) Draw the speed-time graph for the car on the grid above. [3]
 (b) Find the value of d .

Answer (b) $d = \dots\dots\dots$ [1]

- (c) Calculate the distance which the car travels **while it is accelerating**.

Answer (c)..... m [1]

BLANK PAGE